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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/791,365	COFFEY, JOSEPH	
	Examiner	Art Unit	
	LI LIU	2613	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on 21 January 2008.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) 1-19 is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) 1-19 is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on 03 June 2004 is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Response to Arguments

1. Applicant's arguments with respect to claims 1-19 have been considered but are moot in view of the new ground(s) of rejection.

Claim Rejections - 35 USC § 103

2. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

3. Claims 1, 3, 14 and 16-19 are rejected under 35 U.S.C. 103(a) as being unpatentable over Choy et al (US 5,487,120) in view of Lebby et al (US 5,218,465) and Lee et al (US 6,502,997) and Sekiguchi (US 6,814,546).

1). With regard to claim 1, Choy et al discloses a WDM optical system comprising:

first and second WDM's (12a and 12b in Figure 1 and Figure 6);

an optical link (28 in Figure 1 and 6) for transmit and receive signals for each WDM; each WDM including circuitry including a multiplexer (24a in Figure 1 and 25a in Figure 6) and a demultiplexer (24b in Figure 1 and 24a in Figure 6);

each WDM including a plurality of separate optical to electrical converters (LRC 20 in Figure 1 and 6) each at a separate wavelength removably mated with the circuitry (pluggable module, column 6 line 62-64);

each WDM including a plurality of separate electrical to electrical converters (14 in Figure 1 and 6; the IOC card performs the electrical to electrical conversion using the I/O Specific Media Connector, Tx 32 and Rx 34 as well as the ECL buffers 38 and 40; e.g., the Rx 34 receives a native signal format, and the Rx 34 and the ECL 40 convert the native format to another electrical format and then the ECL output the ECL signal; the laser in LRC is operated based on the ECL signals, column 6, line 7-11. And the IOC card is a General Purpose interface, it provides an open capability to support different signal format, column 5 line 1-30. Through the IOC card, the system is protocol-independent WDM system), each mated with one of the optical to electrical converters (42 and 44 in Figure 2, connected to LRC via BACKPLANE), each electrical to electrical converter including input and output signal locations (16a in Figure 1 and 6, column 4, line 14-17).

For the I/O card 14, Choy clearly discloses that the General Purpose interface provides an open capability to support different signal format, including a parallel to serial converter at the transmitting end, and a complementary serial to parallel converter at the receiving end. The use of appropriate parallel to serial and serial to parallel converters is also employed when interfacing to a parallel HIPPI channel. That is the I/O card performs the format change: from one electrical format to another electrical format. And the optical signal is not transmitted via the HIPPI format.

Choy states Each IOC 14 is associated with one of a plurality of communications channels (1-8) and includes an I/O specific media connector 30 that is coupled to an appropriate transmitter (Tx) 32 and receiver (Rx) 34. The components 30, 32, and 34

are constructed and operated in accordance with the specific data stream type that is input to and output from the associated channel of the WDM 12. Choy et al discloses that the channels in WDM 12b is bidirectionally coupled to a bit-serial HIPPI channel or a bit-serial FDDI optical channel (via FDDI-specific media 16b). Choy never states that the same data format such as the HIPPI or the format for FDDI is also transmitted between the multiplexer/demultiplexers 24a and 24b.

As disclosed by the applicant, the electrical to electrical conversion circuitry 100 can be selected for the native protocol media signals which are anticipated for WDM 52. That is, a single E/E card cannot is not compatible for all different input native protocols. And different card is used for different native protocol media signals. Choy et al teaches same techniques: “the ability to select a particular IOC 14 for different serial or parallel data protocols and to add, remove, and to change the IOCs at will is an important feature of the invention. The process of adding a new channel, or converting an existing channel to use a new data protocol, involves merely plugging in the same type of IOCs 14a and 14b into the same numbered slots in the two WDMs 12a and 12b at both ends of the fiber link 28, and providing the appropriate data connections to the connectors 30 at the front of the installed IOCs 14. No configuration, wiring, switch settings or other complex operations are needed. The user must only ensure that the two IOCs 14a and 14b are the same type (FDDI, HIPPI, etc.), and that the associated LRCs 20a and 20b are installed and operate at the same wavelengths”. As disclosed by Choy et al, the operations of LRCs are the same and not change.

Also, another prior art, Lebby et al, in the same field of endeavor, teaches an electrical to electrical converter (27 in Figure 1) to format the incoming raw data into any selected or predetermined format, including but not limited to NRZ, RZ, TRISTATE, DELTAMOD MANCHESTER, etc. In Figure 1, a cross connect apparatus 35 is between the formatting circuitry 27 and the transducer (E/O 22); and optical channel 12 includes a plurality of selected or predetermined optical paths that are normally used for transmission of data and one or more redundant optical paths which are used in the event that one or more of the selected optical paths fails; and the cross connect apparatus 35 is controllable to switch any one of the data input lines from the normal selected optical path to a redundant path. However, Lebby et al also teaches that "While in this specific embodiment cross connect apparatus 35 is simply a group of electrical switches controllable to alter the electrical paths of the electrical data signals, it will be understood by those skilled in the art that the switching might actually be accomplished in the optical circuitry after the electrical data signals have been converted to optical data signals by transducers 22. In the instance of switching optical data signals, cross connect apparatus 35 and transducers 22 are formed as a single unit or have the illustrated positions reversed". That is the E/E formatting circuitry can be directly coupled to the transducer (E/O 22 and O/E 24), and the switching 35 is placed after the E/O circuitry.

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to combine the formatting circuitry and a predetermined

common format as taught by Lebby et al to the system of Choy et al so that the system is more flexible and .

But, Choy et al does not disclose that the electrical to electrical converters is mated with one of the optical to electrical converters at a card edge connector.

Although Choy et al doesn't specifically disclose the card edge connector, such limitation is merely a matter of design choice and would have been obvious in the system of Choy et al. Choy et al teaches that the two converters are connected via a backplane connectors; that is the two converters are connected at a connector - the backplane connector. The limitations in claim 1 do not define a patentably distinct invention over that in Choy et al since both the invention as a whole and Choy et al are directed to a WDM system and use the electrical to electrical converters and optical to electrical converters. Therefore, how to connect the two converters would have been a matter of obvious design choice to one of ordinary skill in the art.

Lee, in the same field of endeavor, also teaches an E/E converter (the transmission interface unit 300 in Figure 3, 400 in Figure 4) and an O/E converter (352 in Figure 3, 420 in Figure 4). The E/E converter converts the input digital signal into a format used for optical transmission (column 4 line 9-17). And a card edge connector (358 in Figure 3, 405 in Figure 4) is used to connect the E/E circuitry card and E/O circuitry card.

And another prior art, Sekiguchi discloses a card edge connector (13 and 14 in Figure 12), which is used to for external tester. The arrangement of the card edge

connector improves the testing efficiency because inserting the card edge connector into the mating connector suffices to make a test.

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to apply a card edge connector as taught by Lee and Sekiguchi to the system of Choy et al so that the electrical to electrical converters and optical to electrical converters are directly connected via a card edge connector, and the system can be made more compact and the diagnosis of devices can be made more convenient.

2). With regard to claim 3, Choy et al and Lebby et al and Lee et al and Sekiguchi disclose all of the subject matter as applied to claim 1 above. And Choy et al further disclose wherein the circuitry includes a backplane (Figure 4) including two optical ports (two port of the BACKPLANE are used to connect to 53 and 54 in Figure 3A) for removably connecting to the separate optical to electrical converters.

3). With regard to claim 14, Choy et al discloses a WDM optical system comprising:

a first WDM (12a in Figure 1 and 6) including a chassis (Figure 4) and circuitry including a multiplexer (24a in Figure 1 or 25a in Figure 6);

a second WDM (12b in Figure 1 and 6) including a chassis (Figure 4) and circuitry including a demultiplexer (24b in Figure 1 or 25b in Figure 6);

an optical link (28 in Figure 1 and 6) for transmitting multiplexed optical signals from the first WDM for receipt by the second WDM;

each WDM including a plurality of separate optical to electrical converter cards (20 in Figure 1 and 6) received by each chassis, each optical to electrical converter card at a separate wavelength (Figure 3a, column 5 line 47-65) and removably mated with the circuitry (pluggable module, column 6 line 62-64);

each WDM including a plurality of separate main signal to electrical converter cards (14 in Figure 1 and 6) received by each chassis, each main signal to electrical converter card mated with one of the optical to electrical converter cards (42 and 44 in Figure 2), each main signal to electrical converter card including a main signal port (30 in Figure 2. The IOC card performs the electrical to electrical conversion using the I/O Specific Media Connector, Tx 32 and Rx 34 as well as the ECL buffers 38 and 40; e.g., the Rx 34 receives a native signal format, and the Rx 34 and the ECL 40 convert the native format to another electrical format and then the ECL output the ECL signal; the laser in LRC is operated based on the ECL signals, column 6, line 7-11. And the IOC card is a General Purpose interface, it provides an open capability to support different signal format, column 5 line 1-30. Through the IOC card, the system is protocol-independent WDM system).

For the I/O card 14, Choy clearly discloses that the General Purpose interface provides an open capability to support different signal format, including a parallel to serial converter at the transmitting end, and a complementary serial to parallel converter at the receiving end. The use of appropriate parallel to serial and serial to parallel converters is also employed when interfacing to a parallel HIPPI channel. That is the I/O

card performs the format change: from one electrical format to another electrical format. And, e.g., the optical signal is not transmitted via the HIPPI format.

Choys states Each IOC 14 is associated with one of a plurality of communications channels (1-8) and includes an I/O specific media connector 30 that is coupled to an appropriate transmitter (Tx) 32 and receiver (Rx) 34. The components 30, 32, and 34 are constructed and operated in accordance with the specific data stream type that is input to and output from the associated channel of the WDM 12. Choy et al discloses that the channels in WDM 12b is bidirectionally coupled to a bit-serial HIPPI channel or a bit-serial FDDI optical channel (via FDDI-specific media 16b). Choy never states that the same data format such as the HIPPI or the format for FDDI is also transmitted between the multiplexer/demultiplexers 24a and 24b.

As disclosed by the applicant, the electrical to electrical conversion circuitry 100 can be selected for the native protocol media signals which are anticipated for WDM 52. That is, a single E/E card cannot is not compatible for all different input native protocols. And different card is used for different native protocol media signals. Choy et al teaches same techniques: “the ability to select a particular IOC 14 for different serial or parallel data protocols and to add, remove, and to change the IOCs at will is an important feature of the invention. The process of adding a new channel, or converting an existing channel to use a new data protocol, involves merely plugging in the same type of IOCs 14a and 14b into the same numbered slots in the two WDMs 12a and 12b at both ends of the fiber link 28, and providing the appropriate data connections to the connectors 30 at the front of the installed IOCs 14. No configuration, wiring, switch settings or other

complex operations are needed. The user must only ensure that the two IOCs 14a and 14b are the same type (FDDI, HIPPI, etc.), and that the associated LRCs 20a and 20b are installed and operate at the same wavelengths". As disclosed by Choy et al, the operations of LRCs are the same and not change.

Also, another prior art, Lebby et al, in the same field of endeavor, teaches an electrical to electrical converter (27 in Figure 1) to format the incoming raw data into any selected or predetermined format, including but not limited to NRZ, RZ, TRISTATE, DELTAMOD MANCHESTER, etc. In Figure 1, a cross connect apparatus 35 is between the formatting circuitry 27 and the transducer (E/O 22); and optical channel 12 includes a plurality of selected or predetermined optical paths that are normally used for transmission of data and one or more redundant optical paths which are used in the event that one or more of the selected optical paths fails; and the cross connect apparatus 35 is controllable to switch any one of the data input lines from the normal selected optical path to a redundant path. However, Lebby et al also teaches that "While in this specific embodiment cross connect apparatus 35 is simply a group of electrical switches controllable to alter the electrical paths of the electrical data signals, it will be understood by those skilled in the art that the switching might actually be accomplished in the optical circuitry <u>after the electrical data signals have been converted to optical data signals by transducers 22</u>. In the instance of switching optical data signals, cross connect apparatus 35 and transducers 22 are formed as a single unit or have the illustrated positions reversed". That is the E/E formatting circuitry can be directly

coupled to the transducer (E/O 22 and O/E 24), and the switching 35 is placed after the E/O circuitry.

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to combine the formatting circuitry and a predetermined common format as taught by Lebby et al to the system of Choy et al so that the system is more flexible.

But, Choy et al does not disclose that the electrical to electrical converters is mated with one of the optical to electrical converters at a card edge connector.

Although Choy et al doesn’t specifically disclose the card edge connector, such limitation is merely a matter of design choice and would have been obvious in the system of Choy et al. Choy et al teaches that the two converters are connected via a backplane connectors; that is the two converters are connected at a connector - the backplane connector. The limitations in claim 1 do not define a patentably distinct invention over that in Choy et al since both the invention as a whole and Choy et al are directed to a WDM system and use the electrical to electrical converters and optical to electrical converters. Therefore, how to connect the two converters would have been a matter of obvious design choice to one of ordinary skill in the art.

Lee, in the same field of endeavor, also teaches an E/E converter (the transmission interface unit 300 in Figure 3, 400 in Figure 4) and an O/E converter (352 in Figure 3, 420 in Figure 4). The E/E converter converts the input digital signal into a format used for optical transmission (column 4 line 9-17). And a card edge connector

(358 in Figure 3, 405 in Figure 4) is used to connect the E/E circuitry card and E/O circuitry card.

And another prior art, Sekiguchi discloses a card edge connector (13 and 14 in Figure 12), which is used to for external tester. The arrangement of the card edge connector improves the testing efficiency because inserting the card edge connector into the mating connector suffices to make a test.

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to apply a card edge connector as taught by Lee and Sekiguchi to the system of Choy et al so that the electrical to electrical converters and optical to electrical converters are directly connected via a card edge connector, and the system can be made more compact and the diagnosis of devices can be made more convenient.

4). With regard to claim 16, Choy et al discloses a method of optical system management comprising:

providing multiplexing and demultiplexing circuitry (24 in Figure 1 and 24 and 25 in Figure 6) for a multi-channel signal system;

mating a plurality of optical to electrical converter cards to the circuitry (22 in Figure 1 and 6, 53 and 54 in Figure 3A), each optical to electrical converter card selected to transmit and receive optical signals at a distinct wavelength of light relative to the other optical to electrical converter cards of the multi-channel system (Figure 3a, column 5 line 47-65);

mating an electrical to electrical converter card to a selected one of the optical to electrical converter cards (18 in Figure 1 and 6, 42 and 44 in Figure 2), wherein the electrical to electrical converter card transmits and receives native protocol media signals in a first format, and converts the signals to a second electrical format (Figure 2, column 4 line 14-17, and line 43-59, and column 5 line 1-13 and line 35-39; the IOC card performs the electrical to electrical conversion using the I/O Specific Media Connector, Tx 32 and Rx 34 as well as the ECL buffers 38 and 40; e.g., the Rx 34 receives a native signal format, and the Rx 34 and the ECL 40 convert the native format to another electrical format and then the ECL output the ECL signal; the laser in LRC is operated based on the ECL signals, column 6, line 7-11. And the IOC card is a General Purpose interface, it provides an open capability to support different signal format, column 5 line 1-30. Through the IOC card, the system is protocol-independent WDM system), wherein the signals of the second electrical format are converted to optical signals at the distinct wavelength of light of the selected optical to electrical converter card (Figure 3a, column 5 line 47-65).

For the I/O card 14, Choy clearly discloses that the General Purpose interface provides an open capability to support different signal format, including a parallel to serial converter at the transmitting end, and a complementary serial to parallel converter at the receiving end. The use of appropriate parallel to serial and serial to parallel converters is also employed when interfacing to a parallel HIPPI channel. That is the I/O card performs the format change: from one electrical format to another electrical format. And, e.g., the optical signal is not transmitted via the HIPPI format.

Choy states Each IOC 14 is associated with one of a plurality of communications channels (1-8) and includes an I/O specific media connector 30 that is coupled to an appropriate transmitter (Tx) 32 and receiver (Rx) 34. The components 30, 32, and 34 are constructed and operated in accordance with the specific data stream type that is input to and output from the associated channel of the WDM 12. Choy et al discloses that the channels in WDM 12b is bidirectionally coupled to a bit-serial HIPPI channel or a bit-serial FDDI optical channel (via FDDI-specific media 16b). Choy never states that the same data format such as the HIPPI or the format for FDDI is also transmitted between the multiplexer/demultiplexers 24a and 24b.

As disclosed by the applicant, the electrical to electrical conversion circuitry 100 can be selected for the native protocol media signals which are anticipated for WDM 52. That is, a single E/E card cannot is not compatible for all different input native protocols. And different card is used for different native protocol media signals. Choy et al teaches same techniques: “the ability to select a particular IOC 14 for different serial or parallel data protocols and to add, remove, and to change the IOCs at will is an important feature of the invention. The process of adding a new channel, or converting an existing channel to use a new data protocol, involves merely plugging in the same type of IOCs 14a and 14b into the same numbered slots in the two WDMs 12a and 12b at both ends of the fiber link 28, and providing the appropriate data connections to the connectors 30 at the front of the installed IOCs 14. No configuration, wiring, switch settings or other complex operations are needed. The user must only ensure that the two IOCs 14a and 14b are the same type (FDDI, HIPPI, etc.), and that the associated LRCs 20a and 20b

are installed and operate at the same wavelengths". As disclosed by Choy et al, the operations of LRCs are the same and not change.

Also, another prior art, Lebby et al, in the same field of endeavor, teaches an electrical to electrical converter (27 in Figure 1) to format the incoming raw data into any selected or predetermined format, including but not limited to NRZ, RZ, TRISTATE, DELTAMOD MANCHESTER, etc. In Figure 1, a cross connect apparatus 35 is between the formatting circuitry 27 and the transducer (E/O 22); and optical channel 12 includes a plurality of selected or predetermined optical paths that are normally used for transmission of data and one or more redundant optical paths which are used in the event that one or more of the selected optical paths fails; and the cross connect apparatus 35 is controllable to switch any one of the data input lines from the normal selected optical path to a redundant path. However, Lebby et al also teaches that "While in this specific embodiment cross connect apparatus 35 is simply a group of electrical switches controllable to alter the electrical paths of the electrical data signals, it will be understood by those skilled in the art that the switching might actually be accomplished in the optical circuitry <u>after the electrical data signals have been converted to optical data signals by transducers 22</u>. In the instance of switching optical data signals, cross connect apparatus 35 and transducers 22 are formed as a single unit or have the illustrated positions reversed". That is the E/E formatting circuitry can be directly coupled to the transducer (E/O 22 and O/E 24), and the switching 35 is placed after the E/O circuitry.

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to combine the formatting circuitry and a predetermined common format as taught by Lebby et al to the system of Choy et al so that the system is more flexible.

But, Choy et al does not disclose that the electrical to electrical converters is mated with one of the optical to electrical converters at a card edge connector.

Although Choy et al doesn't specifically disclose the card edge connector, such limitation is merely a matter of design choice and would have been obvious in the system of Choy et al. Choy et al teaches that the two converters are connected via a backplane connectors; that is the two converters are connected at a connector - the backplane connector. The limitations in claim 1 do not define a patentably distinct invention over that in Choy et al since both the invention as a whole and Choy et al are directed to a WDM system and use the electrical to electrical converters and optical to electrical converters. Therefore, how to connect the two converters would have been a matter of obvious design choice to one of ordinary skill in the art.

Lee, in the same field of endeavor, also teaches an E/E converter (the transmission interface unit 300 in Figure 3, 400 in Figure 4) and an O/E converter (352 in Figure 3, 420 in Figure 4). The E/E converter converts the input digital signal into a format used for optical transmission (column 4 line 9-17). And a card edge connector (358 in Figure 3, 405 in Figure 4) is used to connect the E/E circuitry card and E/O circuitry card.

And another prior art, Sekiguchi discloses a card edge connector (13 and 14 in Figure 12), which is used to for external tester. The arrangement of the card edge connector improves the testing efficiency because inserting the card edge connector into the mating connector suffices to make a test.

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to apply a card edge connector as taught by Lee and Sekiguchi to the system of Choy et al so that the electrical to electrical converters and optical to electrical converters are directly connected via a card edge connector, and the system can be made more compact and the diagnosis of devices can be made more convenient.

5). With regard to claim 17, Choy et al and Lebby et al and Lee et al and Sekiguchi disclose all of the subject matter as applied to claim 16 above. And Choy et al further disclose wherein the electrical to electrical converter card transmits and receives a coaxial native protocol media signal (30 in Figure 2, column 4 line 14-17, and line 43-59, and column 5 line 1-13 and line 35-39).

6). With regard to claim 18, Choy et al and Lebby et al and Lee et al and Sekiguchi disclose all of the subject matter as applied to claim 16 above. And Choy et al further disclose wherein the electrical to electrical converter card transmits and receives a twisted pair native protocol media signal (30 in Figure 2, column 4 line 14-17, and line 43-59, and column 5 line 1-13 and line 35-39).

7). With regard to claim 19, Choy et al and Lebby et al and Lee et al and Sekiguchi disclose all of the subject matter as applied to claim 16 above. And Choy et al

further disclose wherein the electrical to electrical converter card transmits and receives an optical native protocol media signal (30 in Figure 2, column 4 line 14-17, and line 43-59, and column 5 line 1-13 and line 35-39).

4. Claim 2 is rejected under 35 U.S.C. 103(a) as being unpatentable over Choy et al and Lebby et al and Lee et al and Sekiguchi (US 6,814,546) as applied to claim 1 above, and in further view of Ramaswami et al (US 6,571,030).

Choy et al and Lebby et al and Lee et al and Sekiguchi disclose all of the subject matter as applied to claim 1 above. Choy et al teaches “it is within the scope of the invention to provide for two fiber links 28, one a primary link and the other a backup. For this case, a bidirectional optical switch is inserted between the output of the grating 24 and the input of the fiber link 28 for selecting either the primary or the backup fiber. Switching may occur automatically in response to the DPC 26 detecting an absence of received light for all channels (all Received Data Status signals being negated), or may occur manually” (column 9, line 53-62). And Lebby et al also teaches that when an optical path failure is detected by diagnostic and failure detect circuit 40, the cross connect apparatus switches the data signals to a predetermined alternate or redundant optical path; and in some embodiments, each optical path in optical channel 12 has a redundant path which is automatically switched in when a failure in the original optical path is detected; and in embodiments requiring less redundance, a small number of redundant optical paths are supplied and they are switched in, in a predetermined order, as failures in the original optical paths occur (column 4 line 23-36).

But Choy et al does not expressly disclose the WDM optical system further comprising splitter circuitry, wherein the optical link includes dual optical links, wherein two transmit and two receive signal pathways are provided.

However, the redundant 1+1 protection has been widely used in the optical communications for providing extremely rapid recovery from network/path failure. Ramaswami et al discloses one of these protection schemes (Figure 12, column 11, Section IV).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to use the splitter to create two optical paths so that a fast restoration or recovery of signals can be obtained and the system reliability is increased.

4. Claims 4-6 and 15 are rejected under 35 U.S.C. 103(a) as being unpatentable over Choy et al and Lebby et al and Lee et al and Sekiguchi (US 6,814,546) as applied to claim 1 above, and in further view of Jiang et al (US 2002/0024698).

1). With regard to claims 4-6, Choy et al and Sekiguchi disclose all of the subject matter as applied to claim 1 above. And Choy et al further disclose wherein the electrical to electrical converter converts coaxial signals, twisted pair signals or optical signals into an another format electrical signal (30, 32, 34, 38 and 40 in Figure 2, column 4 line 14-17, and line 43-59, and column 5 line 1-13 and line 35-39).

But, Choy et al does not expressly state that the another format electrical signal is a common format signal.

However, it is well known and a widely practice in the art to use an electrical circuitry to convert a native format to a common format so that different types of electronic equipments can be interconnected together through the optical fibers and any type of the information can be transmitted over the network.

Lebby et al teaches an electrical to electrical converter (27 in Figure 1) to format the incoming raw data into any selected or predetermined format, including but not limited to NRZ, RZ, TRISTATE, DELTAMOD MANCHESTER, etc.

Another prior art, Jiang et al, also teaches a WDM system which is capable of tranporting multiple data formats (Figures 1, 2 and 4). For example, Jiang et al discloses that the optical network interface 40 in Figure 1 electrically communicates with plural data sources each of which is configured using a different data format--ATM formatted data source 50, IP formatted data source 60, MPLS formatted data source 70, and TDM formatted data source 70. The optical network interface intelligently groups the information from data sources 50, 60, 70, 80 etc. for placement on the optical channel, λ_1. When the optical channel is selected in accordance with SONET standards, the data groups created by the optical network interface place each data group into a SONET--compatible slot on the optical channel; and the formatted data groups are electrically transmitted to the optical source 30 where an appropriate modulator places the information onto the optical channel through either direct modulation techniques or external modulation techniques. Jiang et al provides a WDM system that imparts the flexibility required to provide access to any type of data format to any customer at any point along an optical network.

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to apply the format conversion in the electrical card as taught by Lebby et al and Jiang et al to the system of Choy et al so that the electrical to electrical converters can convert the native format to a common format, and make the WDM system more flexible, and provide access any type of data format to any customer at any point along an optical network, and also make the equipment compatible with one another.

2). With regard to claim 15, Choy et al and Lebby et al and Lee et al and Sekiguchi disclose all of the subject matter as applied to claim 14 above. And Choy et al further discloses wherein the main signal to electrical converter cards convert between one of coaxial, twisted pair, and optical signals, and specific format electrical signals (column 4 line 14-17, and line 43-59, and column 5 line 1-13 and line 35-39), wherein the optical to electrical converter cards convert between the specific format electric signals and optical signals at one of a selected wavelength for respective multiplexing and demultiplexing by the respective multiplexer and demultiplexer of the first and second WDM's (column 5 line 47 to column 6 line 30).

But, Choy et al does not expressly state that the specific format electric signal is the non return to zero inverted (NRZI) electrical signal.

However, it is well known and a widely practice in the art to use an electrical circuitry to convert a native format to a common format so that different types of electronic equipments can be interconnected together through the optical fibers and any type of the information can be transmitted over the network.

Lebby et al, in the same field of endeavor, teaches an electrical to electrical converter (27 in Figure 1) to format the incoming raw data into any selected or predetermined format, including but not limited to NRZ, RZ, TRISTATE, DELTAMOD MANCHESTER, etc.

Another prior art, Jiang et al, also teaches a WDM system which is capable of transporting multiple data formats (Figures 1, 2 and 4). For example, Jiang et al discloses that the optical network interface 40 in Figure 1 electrically communicates with plural data sources each of which is configured using a different data format--ATM formatted data source 50, IP formatted data source 60, MPLS formatted data source 70, and TDM formatted data source 70. The optical network interface intelligently groups the information from data sources 50, 60, 70, 80 etc. for placement on the optical channel, λ_1. When the optical channel is selected in accordance with SONET standards, the data groups created by the optical network interface place each data group into a SONET--compatible slot on the optical channel; and the formatted data groups are electrically transmitted to the optical source 30 where an appropriate modulator places the information onto the optical channel through either direct modulation techniques or external modulation techniques. Jiang et al provides a WDM system that imparts the flexibility required to provide access to any type of data format to any customer at any point along an optical network.

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to apply the format conversion in the electrical card as taught by Lebby and Jiang et al to the system of Choy et al so that the electrical to

electrical converters can convert the native format to a common format, and make the WDM system more flexible, and provide access any type of data format to any customer at any point along an optical network, and also make the equipment compatible with one another.

As admitted by the applicant, the NRZI is just one of the common format signals. The NRZI is a method of mapping a binary signal to a physical signal for transmission over some transmission media so that it keeps the sending and receiving clocks synchronized. The NRZI has been widely used in the communications since it is especially helpful in situations where bit stuffing is employed -- the practice of adding bits to a data stream so it conforms with communications protocols. And Lebby also teaches that the common format can be any selected or predetermined format, including but not limited to NRZ, RZ, TRISTATE, DELTAMOD MANCHESTER, etc. Therefore, it is obvious that the NRZI format can be used in the system too.

Although Choy et al does not expressly disclose the NRZI, such limitation is merely a matter of design choice and would have been obvious in the system of Choy et al and Lebby et al. Choy et al and Lebby et al's system is fully capable of using NRZI because "[t]he provision of the General Purpose interface provides an open (protocol independent) capability" and "including but not limited to NRZ, RZ, TRISTATE, DELTAMOD MANCHESTER, etc.". The limitations in claim 15 do not define a patentably distinct invention over that in Choy et al and Lebby et al since both the invention as a whole and Choy and Lebby et al are directed to provide a protocol independent capability and support a large variety of serial data stream types.

Therefore, to use NRZI or other type electrical signals would have been a matter of obvious design choice to one of ordinary skill in the art.

5. Claims 7-13 are rejected under 35 U.S.C. 103(a) as being unpatentable over Choy et al (US 5,487,120) in view of Lebby et al (US 5,218,465) and Lee et al (US 6,502,997) and Jiang et al (US 2002/0024698).

1). With regard to claim 7, Choy et al discloses a WDM chassis comprising:

a backplane (Figure 4), including an input power port, a control signal port, and a plurality of optical interface ports for interfacing with an optical to electrical conversion card, each optical interface port including a power port, a control signal port, and at least one optical port (column 7 line 13-22);

a plurality of optical to electrical cards (20 in Figure 3A and 4) each including a backplane interface portion (53 and 54 in Figure 3A connected via BACKPLANE) for mating with the optical interface port and including a power port, a control signal port (Laser Control Status, Received Data Status, column 7 line 20-21), and at least one optical port (53 and 54 in Figure 3A, and I/O Fibers in Figure 4, column 6 line 40-44), each optical to electrical card (20 in Figure 4) including optical to electrical conversion circuitry for converting between common format signals and optical signals (Figure 3A), each optical to electrical card including an electrical interface port (52 and 64 etc in Figure 3A) including a power port, a control signal port, and at least one electrical port (Figure 3A, column 5 line 35 to column 6 line 18);

a plurality of electrical to electrical cards (14 in Figure 2 and 4, column 6 line 62-column 7 line 12) each including a rear interface portion (42 and 44 in Figure 2) for

mating with the electrical interface port and including a power port (column 7 line 13-22, two converters are mated via the backplane connectors), a control signal port (PORT STATUS OUPUT in Figure 2), and at least one electrical port (e.g., 16a and 16b in Figure 1, or 30 in Figure 2, or 42 and 44 in Figure 2), each electrical to electrical card including electrical to electrical conversion circuitry for converting between native protocol media signals and another format signals (30, 32, 34, 38 and 40 in Figure 2, column 4 line 14-17, and line 43-59, and column 5 line 35-39; the IOC card performs the electrical to electrical conversion using the I/O Specific Media Connector, Tx 32 and Rx 34 as well as the ECL buffers 38 and 40; e.g., the Rx 34 receives a native signal format, and the Rx 34 and the ECL 40 convert the native format to another electrical format and then the ECL output the ECL signal; the laser in LRC is operated based on the ECL signals, column 6, line 7-11. And the IOC card is a General Purpose interface, it provides an open capability to support different signal format, column 5 line 1-30. Through the IOC card, the system is protocol-independent WDM system), each electrical to electrical card including a media interface port including at least one main signal port (column 7 line 13-22).

For the I/O card 14, Choy clearly discloses that the General Purpose interface provides an open capability to support different signal format, including a parallel to serial converter at the transmitting end, and a complementary serial to parallel converter at the receiving end. The use of appropriate parallel to serial and serial to parallel converters is also employed when interfacing to a parallel HIPPI channel. That is the I/O

card performs the format change: from one electrical format to another electrical format. And the optical signal is not transmitted via the HIPPI format.

Choy states Each IOC 14 is associated with one of a plurality of communications channels (1-8) and includes an I/O specific media connector 30 that is coupled to an appropriate transmitter (Tx) 32 and receiver (Rx) 34. The components 30, 32, and 34 are constructed and operated in accordance with the specific data stream type that is input to and output from the associated channel of the WDM 12. Choy et al discloses that the channels in WDM 12b is bidirectionally coupled to a bit-serial HIPPI channel or a bit-serial FDDI optical channel (via FDDI-specific media 16b). Choy never states that the same data format such as the HIPPI or the format for FDDI is also transmitted between the multiplexer/demultiplexers 24a and 24b.

As disclosed by the applicant, the electrical to electrical conversion circuitry 100 can be selected for the native protocol media signals which are anticipated for WDM 52. That is, a single E/E card cannot is not compatible for all different input native protocols. And different card is used for different native protocol media signals. Choy et al teaches same techniques: “the ability to select a particular IOC 14 for different serial or parallel data protocols and to add, remove, and to change the IOCs at will is an important feature of the invention. The process of adding a new channel, or converting an existing channel to use a new data protocol, involves merely plugging in the same type of IOCs 14a and 14b into the same numbered slots in the two WDMs 12a and 12b at both ends of the fiber link 28, and providing the appropriate data connections to the connectors 30 at the front of the installed IOCs 14. No configuration, wiring, switch settings or other

complex operations are needed. The user must only ensure that the two IOCs 14a and 14b are the same type (FDDI, HIPPI, etc.), and that the associated LRCs 20a and 20b are installed and operate at the same wavelengths”. As disclosed by Choy et al, the operations of LRCs are the same and not change.

Also, another prior art, Lebby et al, in the same field of endeavor, teaches an electrical to electrical converter (27 in Figure 1) to format the incoming raw data into any selected or predetermined format, including but not limited to NRZ, RZ, TRISTATE, DELTAMOD MANCHESTER, etc. In Figure 1, a cross connect apparatus 35 is between the formatting circuitry 27 and the transducer (E/O 22); and optical channel 12 includes a plurality of selected or predetermined optical paths that are normally used for transmission of data and one or more redundant optical paths which are used in the event that one or more of the selected optical paths fails; and the cross connect apparatus 35 is controllable to switch any one of the data input lines from the normal selected optical path to a redundant path. However, Lebby et al also teaches that “While in this specific embodiment cross connect apparatus 35 is simply a group of electrical switches controllable to alter the electrical paths of the electrical data signals, it will be understood by those skilled in the art that the switching might actually be accomplished in the optical circuitry <u>after the electrical data signals have been converted to optical data signals by transducers 22</u>. In the instance of switching optical data signals, cross connect apparatus 35 and transducers 22 are formed as a single unit or have the illustrated positions reversed”. That is the E/E formatting circuitry can be directly

coupled to the transducer (E/O 22 and O/E 24), and the switching 35 is placed after the E/O circuitry.

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to combine the formatting circuitry and a predetermined common format as taught by Lebby et al to the system of Choy et al so that the system is more flexible.

But, Choy et al does not expressly state that the another format electrical signal is a common format signal.

However, it is well known and a widely practice in the art to use an electrical circuitry to convert a native format to a common format so that different types of electronic equipments can be interconnected together through the optical fibers and any type of the information can be transmitted over the network.

Lee, in the same field of endeavor, also teaches an E/E converter (the transmission interface unit 300 in Figure 3, 400 in Figure 4) and an O/E converter (352 in Figure 3, 420 in Figure 4). The E/E converter converts the input digital signal into a format used for optical transmission (column 4 line 9-17). And a card edge connector (358 in Figure 3, 405 in Figure 4) is used to connect the E/E circuitry card and E/O circuitry card.

Another prior art, Jiang et al, also teaches a WDM system which is capable of tranporting multiple data formats (Figures 1, 2 and 4). For example, Jiang et al discloses that the optical network interface 40 in Figure 1 electrically communicates with plural data sources each of which is configured using a different data format--ATM formatted

data source 50, IP formatted data source 60, MPLS formatted data source 70, and TDM formatted data source 70. The optical network interface intelligently groups the information from data sources 50, 60, 70, 80 etc. for placement on the optical channel, λ_1. When the optical channel is selected in accordance with SONET standards, the data groups created by the optical network interface place each data group into a SONET--compatible slot on the optical channel; and the formatted data groups are electrically transmitted to the optical source 30 where an appropriate modulator places the information onto the optical channel through either direct modulation techniques or external modulation techniques. Jiang et al provides a WDM system that imparts the flexibility required to provide access to any type of data format to any customer at any point along an optical network.

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to apply the format conversion in the electrical card as taught by Lebby et al and Lee et al and Jiang et al to the system of Choy et al so that the electrical to electrical converters can convert the native format to a common format, and make the WDM system more flexible, and provide access any type of data format to any customer at any point along an optical network, and also make the equipment compatible with one another.

2). With regard to claim 8, Choy et al and Lebby et al and Lee et al and Jiang et al disclose all of the subject matter as applied to claim 7 above. And Choy et al further discloses wherein the at least one main signal port is a coaxial port (30 in Figure 2, column 4 line 14-17, and line 43-59, and column 5 line 1-13 and line 35-39).

3). With regard to claim 9, Choy et al and Lebby et al and Lee et al and Jiang et al disclose all of the subject matter as applied to claim 7 above. And Choy et al further discloses wherein the at least one main signal port is a twisted pair port (30 in Figure 2, column 4 line 14-17, and line 43-59, and column 5 line 1-13 and line 35-39).

4). With regard to claim 10, Choy et al and Lebby et al and Lee et al and Jiang et al disclose all of the subject matter as applied to claim 7 above. And Choy et al further discloses wherein the at least one main signal port is an optical port (30 in Figure 2, column 4 line 14-17, and line 43-59, and column 5 line 1-13 and line 35-39).

5). With regard to claim 11, Choy et al and Lebby et al and Lee et al and Jiang et al disclose all of the subject matter as applied to claim 7 above. And Choy et al further discloses wherein the backplane defines a first plane (Figure 4), and the optical to electrical cards each define a second plane (20 in Figure 4) transverse to the first plane (the LRCs are plugged into a slot in the lower row, column 6 line 31 to column 7 line 12).

6). With regard to claim 12, Choy et al and Lebby et al and Lee et al and Jiang et al disclose all of the subject matter as applied to claims 7 and 11 above. And Choy et al further discloses wherein the electrical to electrical cards (14 in Figure 4) each define a third plane parallel to the second plane (IOC and LRC are parallel in Figure 4).

7). With regard to claim 13, Choy et al and Webb and Jiang et al disclose all of the subject matter as applied to claims 7, 11 and 12 above. And Choy et al further discloses the WDM chassis further comprising a chassis housing (66 in Figure 4) wherein the backplane defines a rear of the chassis housing, wherein the optical to

electrical cards and the electrical to electrical cards are received in a front opening of the chassis housing (Figure 4, the IOC and LRC are displaced in front, column 6 line 36-50).

Conclusion

5. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

Macera et al (US 5,490,252);

Bhalla et al (US 6,915,036);

Humpleman (US 7,043,532);

Brolin (US 2004/0246989).

6. Any inquiry concerning this communication or earlier communications from the examiner should be directed to LI LIU whose telephone number is (571)270-1084. The examiner can normally be reached on Mon-Fri, 8:00 am - 5:30 pm, alternating Fri off.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Ken Vanderpuye can be reached on (571)272-3078. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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Li Liu
April 3, 2008

/Kenneth N Vanderpuye/
Supervisory Patent
Examiner, Art Unit 2613